

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN OR RELATING TO ILLUMINATED DIALS.

(71) We, SPERRY RAND LIMITED, a British Company, of Remington House, 65, Holborn Viaduct, London, E.C.1., do hereby declare the invention, for which we pray 5 that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to illuminated 10 dials. The normal dictionary definition of "dial" is a face over which a pointer or hand moves but for the purpose of this specification, the word is intended to cover any face bearing legends or characters 15 irrespective of whether it is associated with a pointer or hand.

Many illuminated dials have an external 20 source of light disposed above or to one side of the dial face but this produces an over-all glow from the face which is unacceptable in certain circumstances, such as in instruments intended for the bridge of a ship, for example. An alternative dial which 25 overcomes this problem employs a transparent or translucent face the surface of which is so treated as to be opaque except for the legends or characters through which light is transmitted from a source positioned at the rear of the face. However, 30 such dials suffer the disadvantage that to achieve a satisfactory intensity of illumination a light source of comparatively high power has to be used which introduces a problem of heat dissipation as well as 35 physical size.

It has been proposed to overcome the 40 last mentioned problem by mounting the source of light, or a plurality of sources, in the actual dial face and relying on internal reflection within the material of the face to distribute the light and illuminate the legends or characters. In certain circumstances, this method of illumination is not 45 entirely satisfactory in giving the required intensity and it is an object of the present

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invention to overcome this problem.

According to one aspect of the invention an illuminated dial comprises a face of transparent or translucent material, and one or more lamps mounted in said face, the latter having legends or characters on at least one surface thereof, which surface is otherwise opaque, each legend or character being coated with a translucent material and having a smooth continuous cross-sectional profile.

With this arrangement, the legends or characters can be made to contrast with the face of the dial whereby they are easily legible in daylight or artificial light conditions without energisation of the lamps, and to contrast equally well in darkness when the lamps are energised.

Preferably all the surfaces of the dial face, 65 except the rear surface, are made opaque, and opaqueness may be achieved by painting the surfaces black. All the surfaces are preferably polished, even though some are subsequently painted, in order to obtain maximum internal reflection of light.

A normal engraving tool will produce a 70 mark or incision having a V-shaped cross section and when the mark is coated with the translucent material, such as paint, the paint tends to build up at the apex of the V with the result that when illuminated the 75 intensity of illumination varies across the mark. In accordance with the present invention, the legends or characters on the face of the dial are engraved with a smooth, continuous cross-sectional profile, which is 80 preferably substantially U-shaped, whereby the translucent paint is more readily evenly coated over the surface.

The dial face may be stepped with a peripheral area or annulus raised with respect to the remaining area, which is thus a recess, and the raised area provided with engraved scale graduations. With this arrangement a 85 pointer may be mounted for movement in 90

the recess of the dial face so as to lie substantially flush with the raised annulus, and hence with the graduations, whereby the problem of parallax is avoided. The pointer 5 may have a tip provided with a Betalight which is a self-contained light actuated by a radio-active gas. Alternatively, the pointer may be illuminated by leaving transparent or translucent a surface, or part of a surface, of the dial face to allow light to fall on the pointer.

According to another aspect of the invention a method of manufacturing an illuminated dial comprises the steps of engraving legends or characters on at least one opaque surface of a face for the dial which is composed of a transparent or translucent material, and coating the legends or characters with a translucent material. 15 Preferably the engraved legends or characters are substantially of U-shaped cross section. To achieve this shape, an engraving tool having a rounded tip is used, and the tool is moved from side to side to obtain the required width of legend.

An illuminated dial embodying the invention will now be described in greater detail, by way of example, with reference to the drawings accompanying the Provisional Specification, in which:—

Figure 1 is a perspective view of the dial face.

Figure 2 is a plan view of the dial.

Figure 3 is a part cross section of Figure 35 2, and

Figures 4 and 5 are details of the dial face to a larger scale.

The dial comprises a 6" diameter circular face 1 of transparent material known under 40 the Registered Trade Mark "Perspex" and provided with a central aperture 2 through which extends a pointer 3 of a meter movement (not shown). The face 1 is stepped in that it has a raised peripheral annulus 4 45 leaving a recess 5 in which the pointer 3 moves. The dimension of the step 6 is such that the pointer 3 lies flush with the surface 7 of the annulus 4, and hence flush with graduations 8 provided on that surface.

50 The surface of the recess 5 is provided with figuring related to the graduations 8. The pointer 3 is provided with a Beta light 9 on its tip, which light is substantially white when viewed in daylight or artificial light, 55 but red when viewed in darkness.

Before the graduations 8 and figuring are engraved on the respective surfaces 7 and 5, all the surfaces of the face 1 are polished and then painted with black matt paint with 60 the exception of the rear surface 11 which is left unpainted. The graduations 8 and figuring are then engraved through the coating of black paint into the respective surfaces and they are formed with a generally 65 U-shaped cross section. It is desirable, in

order to achieve consistency of illumination, for all the graduations and figuring to be engraved to the same depth. Accordingly, in the case of comparatively narrow engravings, the cross sectional shape will be 70 similar to that illustrated in Figure 4, whereas in the case of wider engravings the shape will be similar to that illustrated in Figure 5. On completion of the engraving, the graduations 8 and figuring are 75 coated, in accordance with the invention, with a white translucent paint as indicated at 12 in Figures 4 and 5.

A ring 13 of a plastic or other material is secured to the rear surface 11 of the face 80 1, and six blind holes 14 are drilled through the ring into the rear surface. In each hole 14 there is mounted a red one watt electric lamp 15, the ring 13 serving principally as a mounting for the lamps. The lamps are 85 coloured red by dipping them in a bath containing an appropriate colouring.

The described dial was designed for use in an instrument for installation in the bridge of a ship and there was a strict requirement for white legends or characters, against a black background in daylight or artificial light conditions, and red legends or characters in darkness. The significance of red legends or characters is that red is 95 considered to have the least interference with so-called dark adaption which is the ability of the eye to "see" immediately in darkness after looking at light. However, other colours can be employed as desired. 100 The intensity of illumination is extremely satisfactory in darkness with the lamps 15 energised, without the existence of the problem of an overall glow or glare from the face 1, even though the power requirement 105 of six one watt lamps is low. The lamps 15 are in fact rated at half their capacity to give extended life so the power requirement is even less.

The polished surfaces of the face 1 help 110 to provide maximum internal reflection of light and the coated engraved graduations 8 and figuring provide a catchment for the light which is evenly transmitted through the coating of translucent paint. Thus, the dial is very economic to manufacture and gives highly satisfactory results. A cover not shown, is provided for the face and on removal of this very easy access is provided to the lamps 15 for the purpose of inspection or replacement. Also, there is a marked absence of parallax as a result of the way in which the pointer 3 is mounted flush with the graduations 8, whereby the dial can be viewed from almost any angle without substantial error in reading.

In an alternative arrangement, the inner cylindrical surface of the step 6 may be left unpainted whereby light is transmitted therefrom on to the pointer 3 so that the 130

5 Beta light 9 may be omitted. To increase the efficiency of this method of illuminating the pointer 3, the latter may be provided with a strip of "Perspex" having a line engraved on its underside and coated with white translucent paint.

10 The number of lamps 15 employed depends upon the degree of required brightness consistent with even illumination and sufficient de-rating to obtain extended lamp life. The intensity of illumination can be controlled to a certain extent by variation of the power supply to the lamps 15.

15 If an indication of operative range, for example, is required which involves a movable indicator such as a flag, the latter may be mounted close to the rear surface 11 of the face 1. A window may be provided in the surface 5 or 7 by removing an appropriate area of paint whereby the flag can be viewed from the front of the dial. It is found that the flag appears to the eye to lie close to the surface 5 or 7 and is clearly visible both when the lamps 15 are energised 25 and otherwise.

**WHAT WE CLAIM IS:—**

1. An illuminated dial comprising a face of transparent or translucent material, and 30 one or more lamps mounted in said face, the latter having legends or characters on at least one surface thereof, which surface is otherwise opaque, each legend or character being coated with a translucent material and 35 having a smooth, continuous cross-sectional profile.
2. An illuminated dial according to claim 1, wherein each legend or character has a U-shaped cross-sectional profile.
- 40 3. An illuminated dial according to any of the preceding claims, wherein the legends or characters are engraved on the face.

4. An illuminated dial according to any of the preceding claims, wherein the face is stepped with a peripheral area raised 45 with respect to the remaining area which is thus a recess, and a pointer is mounted for movement in the recess and so as to lie flush with the surface of the peripheral area.

50 5. An illuminated dial according to claim 4, wherein the pointer is illuminated by a source of illumination carried thereon.

6. An illuminated dial according to claim 5, wherein the source of illumination is a 55 Beta light as hereinbefore defined.

7. An illuminated dial according to claim 4, wherein the pointer is illuminated by the lamps mounted in the face of the dial, a surface or part of a surface of the dial being 60 left transparent or translucent to allow light from the lamps to fall on the pointer.

8. An illuminated dial according to any of the preceding claims, wherein the surfaces of the dial are polished.

65 9. An illuminated dial substantially as herein particularly described with reference to the drawings accompanying the Provisional Specification.

10. A method of manufacturing an 70 illuminated dial as claimed in any of the preceding claims, comprising the steps of engraving legends or characters, having a smooth, continuous cross-sectional profile, on at least one otherwise opaque surface 75 of a face for the dial which is composed of a transparent or translucent material, and coating the legends or characters with a translucent material.

Agent for the Applicants.

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PROVISIONAL SPECIFICATION

*This drawing is a reproduction of the Original on a reduced scale.*

